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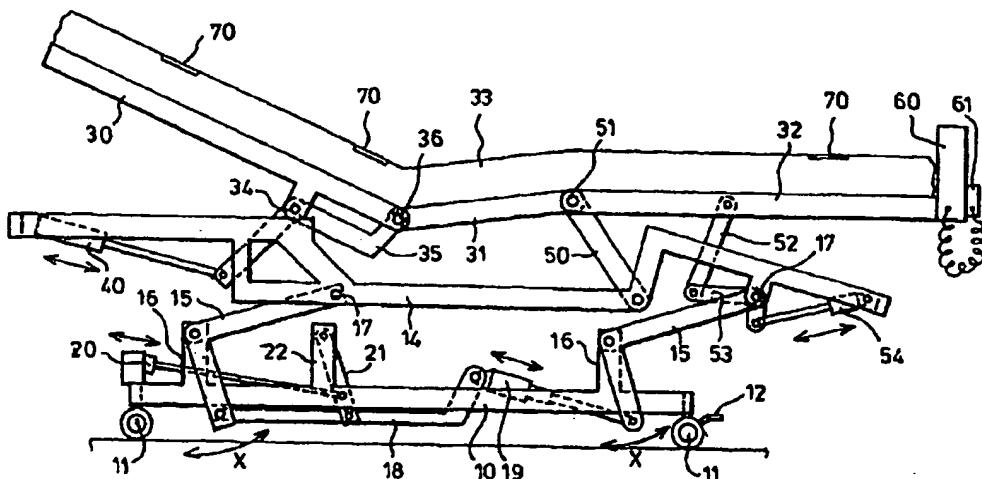
(71) NIGHTINGALE CARE BEDS LIMITED, GB

(51) Int.Cl.<sup>6</sup> A61G 7/057

(30) 1998/04/24 (9808675.4) GB

(54) LIT

(54) BED



(57) L'invention concerne un lit comprenant une pluralité de sections reliées par des articulations, ledit lit étant caractérisé en ce que des moyens permettent le réglage automatique de la configuration des sections du lit à intervalles réguliers.

(57) There is disclosed a bed comprising a plurality of hingedly connected sections, characterised by means automatically to adjust the configuration of the sections of the bed at periodic intervals.



**BED**

This invention concerns a bed of the kind (hereinafter termed of the kind referred to) comprising hingedly connected sections adjustable between a flat configuration and a generally chair-like configuration.

A serious problem in hospitals, nursing homes and similar establishments is the development of pressure sores, particularly with the immobile and elderly. These can manifest in less than one hour and their subsequent treatment can be lengthy and costly.

The present invention is based on the discovery that quite small adjustments in the configuration of a bed of the kind referred have the effect of significantly moving the positions of maximum pressure between an occupant of the bed and the bed mattress.

According to the present invention, there is provided a bed comprising a plurality of hingedly connected sections, characterised by means automatically to adjust the configuration of the sections of the bed at periodic intervals.

The bed may comprise three sections, a back-rest section, a central section and a foot-rest section.

The configuration of the bed may be controlled by a microprocessor.

The configuration of the bed may adjust in accordance with a selected one of a number of predetermined programmes.

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The configuration of the bed may adjust in accordance with an operator generated programme.

The bed may incorporate pressure sensors at critical parts of the body prone to pressure sores of an occupant of the bed, there being means for comparing sensed pressures and the durations thereof with reference data to determine when the occupant is at risk of developing a pressure sore and means for adjusting the configuration of the bed when such risk is determined to mitigate the risk.

Each pressure sensor may comprise an array of strain gauges carried by a mat-like support.

The mat-like support may be located on, within or below the mattress.

There may be three sensors located in the vicinity of the heels, sacrum and shoulders of an occupant of the bed.

Motors may be provided for adjusting the configuration of the bed.

The invention will be further apparent from the following description with reference to the several figures of the accompanying drawings, which show, by way of example only, one form of bed embodying same.

Of the drawings:-

Figure 1 shows a side view of the bed; and

Figures 2-5 show possible different configurations for the sections of the bed.

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Referring firstly to Figure 1, it will be seen that the bed comprises a rectangular base frame 10 which mounts ground engaging castor wheels 11, at least two of which can be immobilised by a brake pedal 12 to prevent unwanted movement of the bed over the floor.

Above the base frame 10 is a sub-frame 14 connected with the base frame 10 by four (two on each side) bell-crank levers 15, whose centre pivots are connected to posts 16 extending upwardly from the base frame 10 and whose upper ends are pivotally connected at 17 to the sub-frame 14.

The lower end of the lever 15 at the head of the bed is connected with the lower end of that at the foot of the bed by a link 18 and linear motor 19.

A further linear motor 20 drives a link 21 pivotally connected between a post 22 extending upwardly from the base frame 10 and the link 18 to move the lower arms of the bell-crank levers 15 forwardly or backwardly in the direction of the arrows X to raise or lower the sub-frame 14 relative to the base frame 10.

Above the sub-frame 14 is the bed itself comprising three hingedly connected sections, a back-rest section 30, a central section 31 and a foot-rest section 32, all of which support a mattress 33 (or mattress sections connected together by slide fasteners).

The back-rest section 30 is pivotally connected with the sub-frame 14 at 34. A bell-crank lever 35 has its centre pivotally connected with the sub-frame 14 at 34, and the distal end of its rear limb pivotally connected with the hinge 36 between the sections 30 and 31. A further linear motor 40 is operable to move the forward limb of the lever 35 fore and aft to raise and lower the back-rest section 30. It should be noted that raising the section 30 causes a lowering of the hinge connection 36 between the

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sections 30 and 31 and vice versa. This has the effect of preventing or minimising sliding movement of an occupant of the bed longitudinally therealong.

The footrest section 32 is connected with the sub-frame 14 by a pair of links 50 (one on each side) pivotally connected between the sub-frame 14 and the hinged connection 51 between the sections 31 and 32.

A link 52 is pivotally connected to the section 32 at its upper end, and to the distal end of a forward limb of a bell crank lever 53 whose centre is pivotally connected at 17 to the distal end of the rearward limb of the lever 15 adjacent the foot of the bed.

A further linear motor 54 is pivotally connected with the lower limb of the bell crank lever 53 to rotate the lever 53 about its centre to raise and lower the section 32 relative to the hinge 51.

Operation of the linear motor 19 causes rotation only of the rearward bell crank lever 15 adjacent the foot of the bed to cause the sub-frame 14 to pivot about the connection 17 between the sub-frame 14 and lever 15 adjacent the head of the bed to effect Trendelenberg movements of the bed.

Figures 2-5 show a number of possible different configurations for the sections of the bed.

The bed is provided with a control panel 60 incorporating a microprocessor capable of performing various functions.

Firstly, one of a number of pre-selected programmes can be selected whereby the configuration of the bed will automatically adjust at pre-determined intervals in accordance with the programme parameters.

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Alternatively, an operator may enter desired ranges of permitted angular movement for the back rest, the foot rest and Trendelenberg movement and a time interval desired between adjustments. The control will then effect adjustments at the pre-determined intervals within the pre-determined parameters on a random basis.

Finally, when pressure sensors 70 are provided within or on the bed mattress 33, the control may automatically adjust the bed to prevent the incidence of pressure levels for periods longer than those which can be tolerated without the risk of pressure sores.

A sub-control panel 61 on an extensible lead is provided to enable an operator or indeed the patient to adjust the bed as desired at any time in any of its possible modes of movement.

The control panels include means to operate the motor 20 to raise and lower the entire bed structure relative to the base frame to position the bed at the most convenient height for re-making or transferring the patient to or from the bed.

It will be appreciated that it is not intended to limit the invention to the above example only, many variations, such as might readily occur to one skilled in the art, being possible, without departing from the scope thereof.

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-6-**CLAIMS**

1. A bed comprising a plurality of hingedly connected sections forming a back-rest section, a central section and a foot-rest section, mechanism whereby raising of the back-rest section causes a lowering of the hinge connection between the back-rest section and the central section and means for automatically adjusting the configuration of the sections of the bed at periodic intervals.
2. A bed according to claim 1 wherein the configuration of the bed is controlled by a microprocessor.
3. A bed according to claim 1 or claim 2 wherein the configuration of the bed adjusts in accordance with a selected one of a number of predetermined programmes.
4. A bed according to any one of claims 1 to 3 wherein the configuration of the bed adjusts in accordance with an operator generated programme.
5. A bed according to any one of claims 1 to 4 which incorporates pressure sensors at critical parts of the body prone to pressure sores of an occupant of the bed, there being means for comparing sensed pressures and the durations thereof with reference data to determine when the occupant is at risk of developing a pressure sore and means for adjusting the configuration of the bed when such risk is determined to mitigate the risk.
6. A bed comprising a plurality of hingedly connected sections, means for automatically adjusting the configuration of the sections of the bed at periodic intervals, and pressure sensors incorporated in the bed at critical parts of the body prone to pressure sores of an occupant of the bed, there being means for comparing sensed pressures and

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the durations thereof with reference data to determine when the occupant is at risk of developing a pressure sore whereby, when such risk is determined, said means for adjusting the configuration of the bed is operated to mitigate the risk.

7. A bed according to claim 5 or 6 wherein each pressure sensor comprises an array of strain gauges carried by a mat-like support.

8. A bed according to claim 5, 6 or 7 wherein there are three sensors located in the vicinity of the heels, sacrum and shoulders of an occupant of the bed.

9. A bed according to any preceding claim wherein linear motors are provided for adjusting the configuration of the bed.

10. A bed as claimed in any one of the preceding claims in which the adjustment of the configuration of said sections involves variation in the hinged relation between said sections.

11. A bed as claimed in any one of the preceding claims including a floor-engaging base frame, a sub-frame mounted on the base frame and means for raising and lowering the sub-frame relative to the base frame, said hingedly connection sections being mounted on the sub-frame in such a way that raising of the back-rest is accompanied by movement of the hinged connection between the back-rest and the central section in a direction towards the base frame.

12. A bed according to claim 8 wherein the configuration of the bed is controlled by a microprocessor.

13. A bed comprising three hingedly connected sections forming a back-rest section, a central section and a foot-rest section, the backrest section being mounted on

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the bed for movement about a fixed pivotal connection located adjacent to but spaced from the hinged connection with the central section, the connection between the backrest and the central sections being free to move up and down during profiling adjustment of the bed whereby, relative to a flat configuration of the sections, the latter connection is lowered when the bed is in a configuration in which the backrest is raised and is raised when the bed is in a configuration in which the backrest is lowered.

14. A bed as claimed in Claim 13 in which the fixed pivotal connection of the backrest is coupled to a frame of the bed and in which the hinged connection between the central section and the foot-rest section is coupled to the frame by a link.

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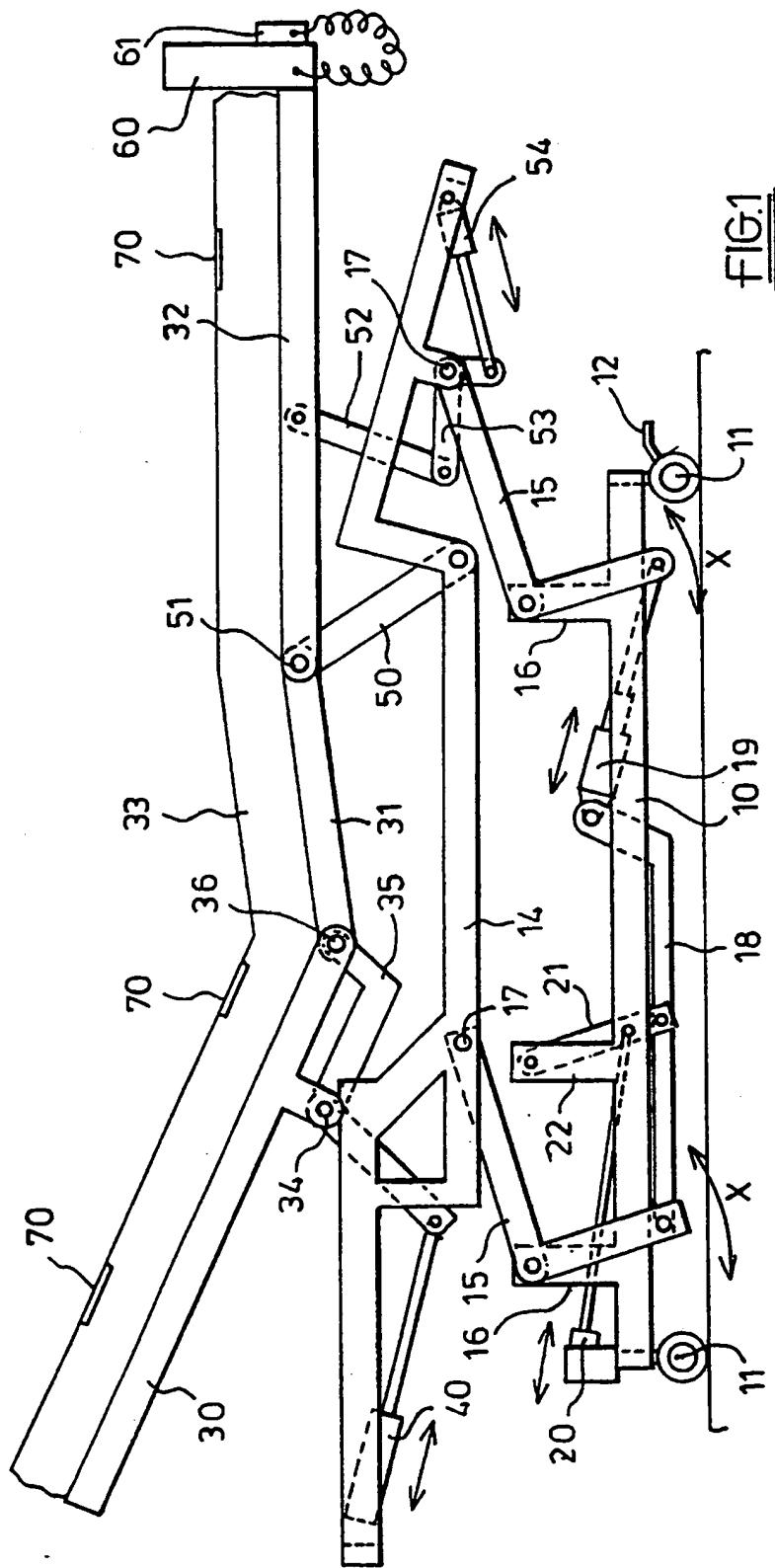


FIG.1

SUBSTITUTE SHEET (RULE 26)

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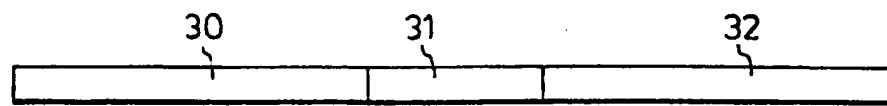


FIG.2

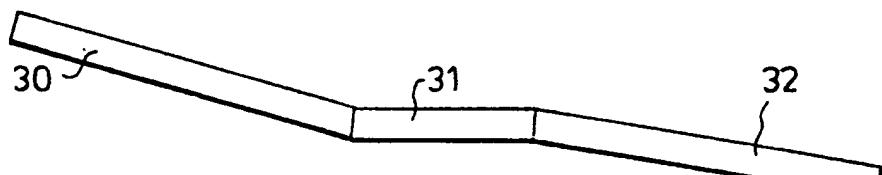


FIG.3

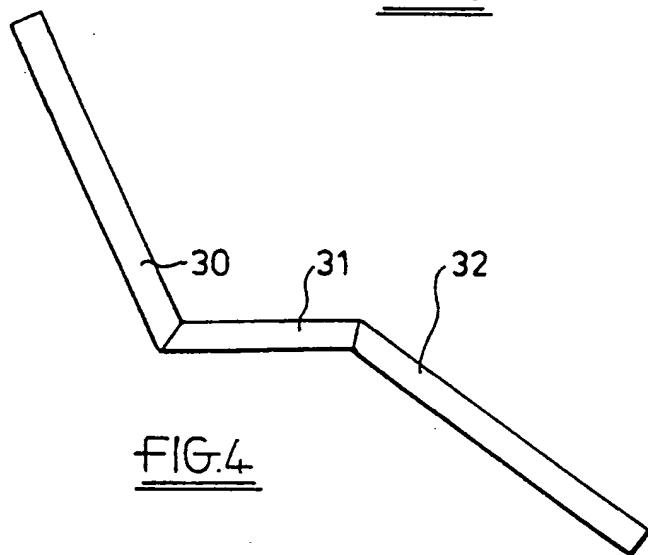


FIG.4

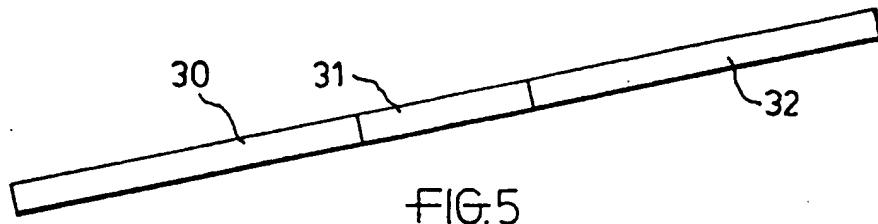


FIG.5